

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claims 62 and 65-78 are requested to be cancelled without prejudice. Claims 47-50, 53-55, 57, 59, 60, 61 and 63-64 are currently being amended. Claims 79-93 are being added. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, Claims 47-61, 63-64 and 79-93 are now pending in this application.

I. Claim Rejections under 35 USC § 103

A. Independent Claims 47 and 55

On page 2 of the Office Action dated July 14, 2008, Claims 47-58 and 63-78 were rejected under 35 USC § 103(a) as being unpatentable over U.S. Patent No. 5,239,173 (Yang) in view of U.S. Patent No. 4,128,300 (Stotts) and U.S. Patent No. 5,233,205 (Usagawa). On page 6 of the Office Action, Claims 47-58 and 63-78 were rejected under 35 USC § 103(a) as being unpatentable over Stotts in view of Usagawa.

Applicant respectfully traverses the rejections.

Independent Claims 47 and 55 (as amended) would not have been obvious in view of Stotts and Usagawa, alone or in any proper combination with Yang under 35 U.S.C. § 103(a). Stotts and Usagawa, alone or in any proper combination with Yang does not disclose, teach or suggest an optical circuit or logic gate “performing an inversion function” comprising, in combination with other elements, “a first semiconductor light source formed on the semiconductor substrate using integrated circuit processing techniques” and “a second semiconductor light source formed on the semiconductor substrate using integrated circuit

processing techniques” formed on the same substrate as the “optical logic gate” as recited in Claim 47 and substantially recited in Claim 55.

Yang discloses a series of chambers configured to receive light from a discrete light source through apertures in the chamber via air or solid light pipes. (Yang at col. 1 lines 66-67). A mechanical or electro-optical shutter is provided at each slit....” (Yang at col. 2 lines 15-). This is not the same as “a first semiconductor light source formed on the semiconductor substrate using integrated circuit processing techniques” and “a second semiconductor light source formed on the semiconductor substrate using integrated circuit processing techniques” formed on the same substrate as the “optical logic gate” as recited in Claim 47 and substantially recited in Claim 55. Further, Yang does not even mention the use of a semiconductor substrate, or first and second semiconductor material as recited in Claims 47 and 55, as amended.

Stotts does not cure the deficiencies of Yang. Stotts discloses a partition (22) as shown in Figures 1-3 which is required for Stotts to operate. The partition diverges the input signal (11) so that other input signals on (18) and (19) in Figure 1 can alter the electromagnetic field across (23) and (24), which in turn, alters the signals in the pathways receiving the input signal (11). This is not the same as “a first semiconductor light source formed on the semiconductor substrate using integrated circuit processing techniques” and “a second semiconductor light source formed on the semiconductor substrate using integrated circuit processing techniques” formed on the same substrate as the “optical logic gate” as recited in Claim 47 and substantially recited in Claim 55, as amended. Further, Stotts does not even mention the use of a semiconductor substrate or a first and second semiconductor material as recited in Claims 47 and 55, as amended.

Usagawa does not cure the deficiencies of Yang or Stotts. In fact, Usagawa teaches away from the subject matter of Claims 47 and 55 because it is configured to use an electron beam as an input rather than a light source. Thus, Usagawa does not disclose, teach or suggest “a first semiconductor light source formed on the semiconductor substrate using integrated circuit processing techniques” and “a second semiconductor light source formed on the semiconductor substrate using integrated circuit processing techniques” formed on the same substrate as the “optical logic gate” as recited in Claim 47 and substantially recited in Claim 55.

To transform Stotts and Usagawa, or Yang, Stotts and Usagawa, into the subject matter of Claims 47 and 55 would require still further modification, and such modification is taught only by the Applicant's own disclosure. The suggestion to make the combination of Stotts and Usagawa, or Yang, Stotts and Usagawa, would have to be taken from the Applicant's own specification, which is improper.

Further, Stotts and Usagawa, alone or in any proper combination with Yang, or does not disclose, teach or suggest an "optical logic gate having a first optical input coupled to the first semiconductor light source formed on the same semiconductor substrate and configured to receive a first light input signal directly from the first semiconductor light source, a second optical input coupled to the second semiconductor light source formed on the same semiconductor substrate and configured to receive a second light input signal directly from the second semiconductor light source" and "an interference region coupled to the first and second optical inputs and configured to receive the first light input signal from the first optical input and the second light input signal from the second optical input ... the interference region comprises the second semiconductor material" as recited in Claim 47 and substantially recited in Claim 55, as amended.

Yang receives light from a discrete light source through slits in the chamber via air or solid optical pipes. This is not the same as an "optical logic gate having a first optical input coupled to the first semiconductor light source formed on the same semiconductor substrate and configured to receive a first light input signal directly from the first semiconductor light source, a second optical input coupled to the second semiconductor light source formed on the same semiconductor substrate and configured to receive a second light input signal directly from the second semiconductor light source" and an interference region comprising a "second semiconductor material" as recited in Claim 47 and substantially recited in Claim 55.

Stotts does not cure the deficiencies of Yang. The partition in Stotts diverges the constant input signal (11) so that other input signals on (18) and (19) in Figure 1 can alter the electromagnetic field across (23) and (24), which in turn, alters the signals in the diverged pathways receiving the input signal (11). Thus, the light converging in optical waveguide (14) of

Stotts, is not the same as receiving “a first light input signal **directly from the first semiconductor light source** ... a second light input signal **directly from the second semiconductor light source**” and wherein “an **interference region** coupled to the first and second optical inputs and **configured to receive the first light input signal** from the first optical input **and the second light input signal** from the second optical input” as recited in Claim 47 and substantially recited in Claim 55. Furthermore, Stotts does not disclose, teach or suggest an “optical logic gate having a first optical input coupled to the first semiconductor light source formed on the same semiconductor substrate and configured to receive a first light input signal directly from the first semiconductor light source, a second optical input coupled to the second semiconductor light source formed on the same semiconductor substrate and configured to receive a second light input signal directly from the second semiconductor light source” as recited in Claim 47 and substantially recited in Claim 55.

Usagawa does not cure the deficiencies of Yang and Stotts. In fact, Usagawa teaches away from the subject matter of Claims 47 and 55 because Usagawa is configured to use an electron beam as an input rather than a light source. Thus, Usagawa does not disclose, teach or suggest an “optical logic gate having a first optical input coupled to the first semiconductor light source formed on the same semiconductor substrate and configured to receive a first light input signal directly from the first semiconductor light source, a second optical input coupled to the second semiconductor light source formed on the same semiconductor substrate and configured to receive a second light input signal directly from the second semiconductor light source” as recited in Claim 47 and substantially recited in Claim 55.

To transform Stotts and Usagawa, or Yang, Stotts and Usagawa, into the subject matter of Claim 47 and 55 would require still further modification, and such modification is taught only by the Applicant’s own disclosure. The suggestion to make the combination of Stotts and Usagawa, or Yang, Stotts and Usagawa, would have to be taken from the Applicant’s own specification, which is improper.

Independent Claims 47 and 55, considered as a whole, would not have been obvious in view of Stotts and Usagawa, or Yang, Stotts and Usagawa. The rejection of Claims 47 and 55

over Stotts and Usagawa, or Yang, Stotts and Usagawa under 35 U.S.C. § 103(a) is improper. Therefore, Claims 47 and 55 are patentable over Stotts and Usagawa, or Yang, Stotts and Usagawa.

Dependent Claims 48-54, which depend from independent Claim 47, are also patentable for at least the same reasons as Claim 47. Dependent Claims 56-61 and 63-64, which depend from independent Claim 55, are also patentable for at least the same reasons as Claim 55.

Further, Claim 49 (as amended) would not have been obvious in view of Stotts and Usagawa, alone or in any proper combination with Yang under 35 U.S.C. § 103(a). Stotts and Usagawa, alone or in any proper combination with Yang does not disclose, teach or suggest, in combination with other elements, “a third semiconductor light source formed on the semiconductor substrate, wherein the interference region includes a third optical input coupled to the third semiconductor light source formed on the same semiconductor substrate and configured to receive a third light input signal directly from the third semiconductor light source” as recited in Claim 49.

Further, Claim 57 (as amended) would not have been obvious in view of Stotts and Usagawa, alone or in any proper combination with Yang under 35 U.S.C. § 103(a). Stotts and Usagawa, alone or in any proper combination with Yang does not disclose, teach or suggest, in combination with other elements, “a fourth optical conduit coupled to the interference region and configured to receive a third light input signal directly from a third semiconductor light source formed on the semiconductor substrate” as recited in Claim 57.

The Applicant respectfully requests withdrawal of the rejection of Claims 47-58 and 63-64 under 35 U.S.C. § 103(a).

B. Dependent Claims 59-62

On page 5 of the Office Action, Claims 59-62 were rejected under 35 USC § 103(a) as being unpatentable over Yang, Stotts and Usagawa, and further in view of U.S. Patent No. 3,837,728 (Logan). On page 8 of the Office Action, Claims 59-62 were rejected under 35 USC §

103(a) as being unpatentable over Stotts and Usagawa, and further in view of Logan.

Claim 62 is requested to be cancelled without prejudice. Claims 59-61 depend from Claim 55 and are allowable for at least the same reasons as Claim 55.

Further, Claim 61 (as amended) would not have been obvious in view of Yang, alone or in any proper combination with Stotts, Usagawa and Logan under 35 U.S.C. § 103(a). Yang alone or in any proper combination with Stotts, Usagawa, and Stotts and Usagawa, alone or in any proper combination with Logan, does not disclose, teach or suggest, in combination with other elements, “an electromagnetic detector formed on the semiconductor substrate and coupled to the third optical conduit and configured to convert the optical output signal into an electrical signal” as recited in Claim 61. The rejection of Claim 61 over Yang in view of Stotts, Usagawa and Stotts and Usagawa in view of Logan, under 35 U.S.C. § 103(a) is improper. Therefore, Claim 61 is patentable over Yang, Stotts, Usagawa and Logan.

II. New Claims 79-93

A. Independent Claim 79

Applicant respectfully submits that independent Claim 79 and Claims 80-88, which depend from Claim 79, are allowable over Yang, Stotts, Usagawa and Logan. None of the references cited by the Examiner disclose, teach or suggest and optical circuit “performing an inversion function” comprising, in combination with other elements, “a first semiconductor light source formed on the semiconductor substrate using integrated circuit processing techniques; a second semiconductor light source formed on the semiconductor substrate using integrated circuit processing techniques” and “a first optical input pathway coupled to the first semiconductor light source formed on the same semiconductor substrate and configured to receive a first light input signal directly from the first semiconductor light source, a second optical input pathway coupled to the second semiconductor light source formed on the same semiconductor substrate and configured to receive a second light input signal directly from the second semiconductor light source..., an interference region coupled to the first and second optical input pathways and configured to receive the first light input signal from the first optical

input pathway and the second light input signal from the second optical input pathway” as recited in Claim 79.

To transform Yang, Stotts, Usagawa and Logan into the subject matter of Claim 79 would require still further modification, and such modification is taught only by the Applicant’s own disclosure. The suggestion to make the combination of Yang, Stotts, Usagawa and Logan would have to be taken from the Applicant’s own specification, which is improper.

Thus, independent Claim 79, considered as a whole, would not have been obvious in view of Yang, Stotts, Usagawa and Logan. Therefore, Claim 79 is patentable over Yang, Stotts, Usagawa and Logan.

Dependent Claims 80-88, which depend from independent Claim 79, are also patentable for at least the same reasons as Claim 79.

Further, Claim 82 is allowable over Yang, Stotts, Usagawa and Logan. Yang alone or in any proper combination with Stotts, Usagawa and Logan does not disclose, teach or suggest, in combination with other elements, “a third semiconductor light source formed on the semiconductor substrate using integrated circuit processing techniques, wherein the optical layer further comprises a third optical input pathway coupled to the interference region and to the third semiconductor light source formed on the same semiconductor substrate, the third optical input pathway being configured to receive a third light input signal directly from the third semiconductor light source” as recited in Claim 82. Thus, Claim 82 is patentable over Yang, Stotts, Usagawa and Logan.

Further, Claim 83 is allowable over Yang, Stotts, Usagawa and Logan. Yang alone or in any proper combination with Stotts, Usagawa and Logan does not disclose, teach or suggest, in combination with other elements, “a second interference region ... a fourth optical input pathway coupled to a fourth semiconductor light source formed on the same semiconductor substrate and configured to receive a fifth light input signal directly from the fourth semiconductor light source ... wherein the second interference region comprises the second semiconductor material and is bounded on all sides by semiconductor material other than the

second semiconductor material” as recited in Claim 83. Thus, Claim 83 is patentable over Yang, Stotts, Usagawa and Logan.

Further, Claim 85 is allowable over Yang, Stotts, Usagawa and Logan. Yang alone or in any proper combination with Stotts, Usagawa and Logan does not disclose, teach or suggest, in combination with other elements, “wherein the first and second light sources are semiconductor lasers comprising $\text{Al}_x\text{Ga}_{1-x}\text{As}_y\text{Sb}_{1-y}$ ” as recited in Claim 85. Thus, Claim 85 is patentable over Yang, Stotts, Usagawa and Logan.

Further, Claim 86 is allowable over Yang, Stotts, Usagawa and Logan. Yang alone or in any proper combination with Stotts, Usagawa and Logan does not disclose, teach or suggest, in combination with other elements, “wherein the first and second sources are semiconductor lasers comprising $\text{Ga}_x\text{In}_{1-x}\text{As}_y\text{P}_{1-y}$ ” as recited in Claim 86. Thus, Claim 86 is patentable over Yang, Stotts, Usagawa and Logan.

Further, Claim 88 is allowable over Yang, Stotts, Usagawa and Logan. Yang alone or in any proper combination with Stotts, Usagawa and Logan does not disclose, teach or suggest, in combination with other elements, “an electromagnetic detector formed on the semiconductor substrate and coupled to the first optical output pathway and configured to convert the first output light signal into an electrical signal” as recited in Claim 88. Thus, Claim 88 is patentable over Yang, Stotts, Usagawa and Logan.

Claim 89 depends from Claim 47 and is allowable for at least the same reasons as Claim 47. Further, Yang alone or in any proper combination with Stotts, Usagawa and Logan does not disclose, teach or suggest, in combination with other elements, “an electromagnetic detector formed on the semiconductor substrate and coupled to the optical output of the interference region and configured to convert the output light signal into an electrical signal” as recited in Claim 89. Thus, Claim 89 is patentable over Yang, Stotts, Usagawa and Logan.

B. Independent Claim 90

Applicant respectfully submit that independent Claim 90 and Claims 91-93, which depend from Claim 90, are allowable over Yang, Stotts, Usagawa and Logan. None of the references cited by the Examiner disclose, teach or suggest a “method of forming an optical logic circuit configured to perform an inversion function” comprising, in combination with other elements, “depositing a second semiconductor material above the semiconductor substrate to form an optical layer” and “etching the optical layer in accordance with a pattern to form a plurality of optical pathways, the plurality of optical pathways forming an optical logic gate, the optical logic gate comprising an interference region, a first optical input pathway coupled to the interference region and configured to receive a first light input signal directly from a first semiconductor light source, a second optical input pathway coupled to the interference region and configured to receive a second light input signal directly from a second semiconductor light source ... wherein the interference region is configured to receive the first light input signal from the first optical input pathway and the second light input signal from the second optical input pathway” as recited in Claim 90.

To transform Yang, Stotts, Usagawa and Logan into the subject matter of Claim 90 would require still further modification, and such modification is taught only by the Applicant’s own disclosure. The suggestion to make the combination of Yang, Stotts, Usagawa and Logan would have to be taken from the Applicant’s own specification, which is improper.

Thus, independent Claim 90, considered as a whole, would not have been obvious in view of Yang, Stotts, Usagawa and Logan. Therefore, Claim 90 is patentable over Yang, Stotts, Usagawa and Logan.

Dependent Claims 91-93, which depend from independent Claim 90, are also patentable for at least the same reasons as Claim 90.

Further, Claim 91 is allowable over Yang, Stotts, Usagawa and Logan. Yang alone or in any proper combination with Stotts, Usagawa and Logan does not disclose, teach or suggest, in combination with other elements, “wherein the first and second semiconductor light sources are

formed on the same semiconductor substrate as the optical logic gate” as recited in Claim 91. Thus, Claim 91 is patentable over Yang, Stotts, Usagawa and Logan.

Further, Claim 92 is allowable over Yang, Stotts, Usagawa and Logan. Yang alone or in any proper combination with Stotts, Usagawa and Logan does not disclose, teach or suggest, in combination with other elements, “wherein the optical layer of the logic gate also forms the junction layer of the first and second semiconductor light sources” as recited in Claim 92. Thus, Claim 92 is patentable over Yang, Stotts, Usagawa and Logan.

Further, Claim 93 is allowable over Yang, Stotts, Usagawa and Logan. Yang alone or in any proper combination with Stotts, Usagawa and Logan does not disclose, teach or suggest, in combination with other elements, “wherein the junction layer of the first and second semiconductor light sources is etched in accordance with the pattern to coupled to the first and second optical input pathways, respectively” as recited in Claim 93. Thus, Claim 93 is patentable over Yang, Stotts, Usagawa and Logan.

Accordingly, Applicant respectfully submits that Claims 79-93 are patentable over Yang, Stotts, Usagawa and Logan.

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Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by the credit card payment instructions in EFS-Web being incorrect or absent, resulting in a rejected or incorrect credit card transaction, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of

papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date 11/13/08

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